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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/865,028	05/24/2001	Andrew M. Weiner	12818-003001	2898

26161 7590 12/13/2005

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EXAMINER	
TRAN, DZUNG D	
ART UNIT	**PAPER NUMBER**
2638	

DATE MAILED: 12/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/865,028	WEINER, ANDREW M.
	Examiner	Art Unit
	Dzung D Tran	2633

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 09/19/2005.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-24,49,70,73,74,77 and 80-83* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 3-24, 49, 70, 73, 74, 77 & 80-83* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 3-11, 17-19, 49 and 77 are rejected under 35 U.S.C. 1O3(a) as being unpatentable over U.S. Patent no. 6,275,623 to Brophy et al. (hereinafter Brophy) in view of U.S. Patent no. 6,385,357 to Jopson et al. (hereinafter Jopson).

Regarding claims 1 and 77, Brophy discloses in figure 1, an optical processing system comprising: a dispersive element (40) positioned to receive the optical signal and spatially separate frequency components of the optical signal (Col. 5, lines 4-15), a spatial light modulator (50) having multiple regions (i.e. pixels) with an independently adjustable polarization transfer matrix (Figure 3, Col. 6,lines 10-19), the SLM positioned to receive (Col. 5, lines 16-23) the spatially separated frequency components on the multiple regions and a controller (62) coupled to the SLM, wherein during operation the controller causes the SLM to independently adjust the polarization transfer matrix of the multiple regions to reduce the distortion (i.e., improve signal to noise ratio) of optical signal (col. 2, lines 17-19, lines 32-42, col. 3, lines 20-25, and col. 5, lines 24-33).

Brophy differs from claims 1 and 77 of the present invention in that Brophy does not specifically discloses the frequency dependent polarization effects that cause wavelength dependent changes in the state of polarization (SOP) of the optical signal.

Jopson discloses the frequency dependent polarization effects that cause wavelength dependent changes in the state of polarization (SOP) of the optical signal (Col. 6, lines 21-29).

At the time of the invention was made, it would have been obvious to a person of ordinary skill in the art to include the teaching of Jopson in the system of Brophy. One of ordinary skill in the art would have been motivated to do this in order to change the polarization of the wavelength. Thus it reduces the cross-talk and noise interference between the wavelengths.

Regarding claim 3, Jopson discloses the frequency-dependent polarization effects include polarization mode dispersion (PMD) effects (e.g., introduced by 730 of Fig.7 and Col. 2, lines 18-24).

Regarding claim 4, Jopson discloses the polarization mode dispersion (PMD) effects can be represented by a frequency-dependent polarization transfer matrix characterized by a frequency-dependent differential delay and principle state of polarization (Col. 2, lines 37-40).

Regarding claims 5-8, Brophy discloses multiple signals on separate wavelength bands (i.e. WDM, Col. 1, lines 52-55), includes at least one optical fiber (12 of Fig.1), recombining (via 42 of Fig. 1) following adjustment and monitoring (via 60 of Fig. 1) the frequency-dependent polarization effects.

Regarding claim 9, Brophy discloses the adjustments by the spatial light modulator are in response to the monitoring of the frequency-dependent polarization effects (e.g. 50 is adjusted by 62 in response from 58 and 60 of Fig. 1).

Regarding claim 10, Brophy discloses the spatial dispersion of the frequency components comprises a prism (32 of Fig. 1 (not labeled), Col. 4, lines 59-61) or grating (40 of Fig. 1, Col. 5, lines 12-15).

Regarding claim 11, Brophy discloses the spatial light modulator comprises at least one liquid crystal layer (e.g. since it's a liquid crystal modulator, it comprises at least one liquid crystal layer, Col. 3, lines 40-42).

Regarding claims 17-19, Brophy discloses an adjustment to phase (Col. 2, lines 17-19, lines 32-42, Col. 3, lines 20-25 and Col. 5, lines 24-33).

Regarding claim 49, Brophy discloses using the SLM to selectively vary the intensity (Col. 2, lines 17-19, lines 32-42, Col. 3, lines 20-25 and Col. 5, lines 24-33).

3. Claims 1, 3, 4, 6, 10-24, 70, 73, 74 and 77 are rejected under 35 U.S.C. 1O3(a) as being unpatentable over U.S. Patent No. 5,71 9,650 to Wefers (hereinafter Wefers) in view Brophy and further in view of U.S. Patent no. 6,385,357 to Jopson et al. (hereinafter Jopson).

Regarding claim 1 Wefers discloses optical processing method (Fig. 5) comprising: spatially dispersing frequency components (via 16a and l8a) of an optical signal on a spatial light modulator (12 (not labeled on Fig. 5) and Col. 5, lines 55-66), and independently adjusting the polarization transfer matrix (i.e. each pair of pixels) of

multiple regions of the SLM a to at least partially pre-compensate the optical signal (e.g. via controlling the voltages that are applied to each registered pixel pair of phases and amplitudes of each of the dispersed optical frequencies, Col. 5, line 66 to Col. 6, line 13) for distortions caused by the frequency dependent polarization effects in the downstream optical system. Wefers does not explicitly disclose providing a pre-compensation signal indicative of frequency-dependent polarization effects in a downstream optical system. Brophy discloses providing a pre-compensation signal (via 58, 60 and 62 of Fig. 1) indicative of frequency dependent (i.e. wavelength) polarization effects (Co1. 2, lines 26-34 and Col. 4, lines 55-59) in a downstream optical system (via 12 of Fig. 1 or 166 of Fig. 10). Accordingly, one of the ordinary skilled in the art would have been motivated to provide a pre-compensation signal indicative of frequency dependent polarization effects for reducing the differences between the monitored and desired power (or phases and polarities, Col. 2, lines 17-19, lines 32-42, Col. 3, lines 20-25 and Col. 5, lines 24-33) distributions among the channels (Col. 2, lines 13-17). Therefore, it would have been obvious to one of ordinary from the same endeavor at the time the invention was made to modify the spatial light modulator of Wefers by incorporating a pre-compensating signal because this reduces the differences between the monitored and desired power, phases or polarities distributions among the channels as suggested by Brophy. Also, pre-compensation in an optical system for compensating PMD is notoriously well known and conventional. Since optical signals being transmitted via optical fibers are often distorted by PMD due to variations in the direction of polarization of the input signal and from added fluctuations caused by longitudinal and

transverse variations in the refractive index profile along the fiber or other transmitting means, one pf artisan could have been motivated to incorporate a pre-compensation signal (e.g. supplied by controlling means, feedback means or amplifying means) at the input for pre-compensating dispersion before the distorted signal is transmitted. Otherwise, the distorted signal can degrade, reduce and downgrade the bandwidth, signal-to-noise ratio and efficiency of transmission as known in the art.

The combination of Wefers and Brophy differs from claim 1 of the present invention in that Wefers and Brophy do not specifically discloses the frequency dependent polarization effects that cause wavelength dependent changes in the state of polarization (SOP) of the optical signal. Jopson discloses the frequency dependent polarization effects that cause wavelength dependent changes in the state of polarization (SOP) of the optical signal (Col. 6, lines 21-29).

At the time of the invention was made, it would have been obvious to a person of ordinary skill in the art to include the teaching of Jopson in the system of Wefers and Brophy. One of ordinary skill in the art would have been motivated to do this in order to change the polarization of the wavelength. Thus it reduces the cross-talk and noise interference between the wavelengths.

Regarding claim 77, Wefers further discloses a controller (col. 6, lines 26-27) coupled to the SLM, wherein during operation the controller causes the SLM to independently adjust the polarization transfer matrix of the multiple regions to reduce the distortion of optical signal (col. 6, lines 26-28).

Regarding claim 10, Wefers discloses the spatial dispersion of the frequency component 16a is a grating (col. 5, lines 55-56).

Regarding claim 11, Wefers discloses the spatial light modulator (figures 1, 2) comprises at least one liquid crystal layer (col. 3, lines 66-67).

Regarding claims 12-16, Wefers discloses the spatial light modulator (figures 1, 2) comprises at least two liquid crystal layers (col. 3, lines 44-45, col. 11. lines 11-12) or three liquid crystal layers (col. 12, lines 1-12) wherein the axis for one of the LC layers is different from the axis of another of the LC layers (e.g., first axis is disposed at 0 degree relative to polarization axis, second axis angled at about 42-48 degree relative to first axis and fourth axis is axis angled at about 90 degree relative to polarization axis) and the axes differ from one another by an absolute amount of about 45 degrees (col. 4, lines 4-14).

Regarding claims 17-20, Wefers discloses the adjustments to the polarization transfer matrix are selected to cause an adjustment to at least one of the phase, the state of polarization and amplitude of each of multiple subsets of the spatially dispersed frequency components (col. 1, lines 31-45, col. 5, lines 10-44).

Regarding claim 21, Wefers discloses the adjustments caused by the SLM at least partially pre-compensate (e.g., via a controller, col. 6, lines 26-28 and col. 7, lines 44-48) for the PMD.

Regarding claim 22, Wefers discloses the distortions comprise broadening of mean pulse duration (e.g., figure 7 A and col. 6, lines 64-67) in the optical signal, and wherein the adjustments reduce the broadening (e.g., figure 6 B and by pulse shaping,

and col. 1, lines 22-63 or by adjusting phases and amplitudes of incident field) caused by the downstream optical system.

Regarding claim 23, Wefers discloses the adjustments are selected to cause the state of polarization (SOP) of at least some of the frequency components to be substantially the same (i.e., since applying voltages via a controller to each pixel can adjust the polarization for a component of the field (col. 4, lines 49-67), one could have been motivated to select an adjustment to cause the state of polarization (SOP) of at least some of the frequency components to be substantially the same) following transmission through the downstream optical system.

Regarding claims 24 and 70, Jopson discloses the adjustments are selected to cause the delay of the at least some of the frequency components to be substantially the same following transmission through the downstream optical system (e.g. the group time delay (or DGD as known in the art) of PMD can be eliminated (or adjusted) by launching the light beam with a polarization that is aligned with one of two input PSP, Col. 4, lines 1-16 or by adjusting PMD so that $\Omega 1$ and $\Omega 2$ can be adjusted since DGD is a function of frequency along a particular PSP and change of direction of PSP, Col. 6, lines 21-29 and Col. 12, lines 5-15).

Regarding claims 73-74, Jopson and Wefers discloses the adjustments are selected to cause the phase (i.e. direction) of the at least some of the frequency components to be substantially the same (e.g. by changing its corresponding frequency, Col. 2, lines 51-61 and Col. 3, lines 52-56 or by adjusting PSP, Col. 4, lines 17-24, Jopson or by via filters which impart linear spectral phase sweeps on x and y polarized

components, Col. 1, lines10-1 5, Wefers) and vary substantially linearly with frequency (e.g. phase (or direction) can be vary linearly since it is directly related to frequency, Col. 2, lines 51-61 and Col. 6, lines 2 1-29 and Col. 8, lines 7-10, Jopson) following transmission through the downstream optical system.

Regarding claim 3, Jopson discloses the frequency-dependent polarization effects include polarization mode dispersion (PMD) effects (e.g., introduced by 730 of Fig.7 and Col. 2, lines 18-24).

Regarding claim 4, Jopson discloses the polarization mode dispersion (PMD) effects can be represented by a frequency-dependent polarization transfer matrix characterized by a frequency-dependent differential delay and principle state of polarization (Col. 2, lines 37-40).

Regarding claim 6, Jopson discloses the downstream optical system includes at least one optical fiber (e.g. 730, the link which connects 720 to 745 of Fig. 7).

4. Claims 80-83 are rejected under 35 U.S.C. 1O3(a) as being unpatentable over U.S. Patent no. 6,275,623 to Brophy et al. (hereinafter Brophy) in view of U.S. Patent no. 6,385,357 to Jopson et al. (hereinafter Jopson) and further in view of Sharp et al. U.S. Patent no. 6,273,571.

Regarding claims 80 and 82, as per claim 1 above, the combination of Brophy and Jopson does not disclose a multiple spatial light modulators optically coupled to one another. Sharp disclose a multiple spatial light modulators 1024 optically coupled to one another (Fig. 3c; col. 11, lines 9-17).

At the time of the invention was made, it would have been obvious to a person of ordinary skill in the art to include the teaching of Sharp in the system of Brophy and Jopson. One of ordinary skill in the art would have been motivated to do this in order to detect the polarization of the multiple wavelengths. Thus it reduces the cross-talk and noise interference between the wavelengths.

Regarding claims 81 and 83, one skill in the art would understand that the multiple spatial light modulators optically coupled to one another over the light beam can be optically coupled to one another over the fiber.

Response to Arguments

5. Applicant's arguments with respect to claims 1, 3-24, 49, 70, 73, 74, 77 and 80-83 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dzung D Tran whose telephone number is (571) 272-3025. The examiner can normally be reached on 9:00 AM - 7:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye, can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Dzung Tran

Dzung Tran
12/05/2005